Prediction of flyrock in boulder blasting by using artificial neural network

Abstract :

Rock mass is blasted to break it into smaller pieces such as in most surface mining, quarrying operation, dimensional stone mining and some civil engineering application. Flyrock is one of the most hazardous side effects of blasting operation in surface mining. This phenomenon can be considered as the main cause of casualties and damages. The aim of this study is to compare the actual distance of flyrock with the prediction suggested by empirical methods and by using Artificial Neural Network. In addition, this study is also aimed to investigate the most significant input parameters that affecting the flyrock. During this study, flyrock projections for 16 granitic boulders were monitored at Ulu Tiram-quarry site. Blasting parameters such as amount of explosive used, burden, stemming, hole depth, hole angle and hole diameter were carefully measured and recorded. By using these data and applying MATLAB (Matrix Laboratory) program (neural network toolbox), the flyrock distances were predicted for similar condition. The result shows that the coefficient of correlation between the actual and the predicted flyrock distance based on empirical methods is insignificant that is around 0.2. However the result revealed that the coefficient of correlation for overall analysis of flyrock distance is 0.92 based on ANN method. Based on Max-Min method powder factor, stemming and charge length are the most significant parameters in controlling the flyrock distance. This study found that ANN method produced a more accurate prediction than the empirical methods in assessing the actual flyrock projection.